

## **Remarks**

Claims 25 - 48 are pending. Favorable reconsideration is respectfully requested.

Claim 24 has been cancelled in favor of new claim 43. The new claim is fully supported by the specification as filed. Support for the presence of Portland cement or pozzolanic cement is given at page 6, lines 18 - 21; support for the presence of calcium aluminate as a non-Newtonian additive is given on page 7, lines 1 - 4; support for an associative thickener as a non-Newtonian additive is found on page 7, lines 5 - 14; the range of superplasticizer has been amended to "from 0.1 weight percent to about 10 weight percent", support for which may be found on page 9, line 11.

Claim 27 has been amended to be dependent upon claim 43 and has been further amended to recite that the associative thickener is a polyether thickener with an internal hydrophile and external hydrophobes, as disclosed on page 7, lines 19 - 24.

Claim 29 has been amended to recite that the polyvinyl alcohol fibers of this claim are oiled. Support may be found on page 10, line 22. Claim 30 has been amended to be consistent with the language of new claim 43. New claims 44 - 45 require the sprayable mortar to be able to produce a considerable single layer thickness without sagging or dripping. Support may be found on page 6, lines 1 - 4 and page 16, lines 11 - 24. New claim 46 further limits the range of superplasticizer, support for which may be found in the specification on page 9, line 12. New claims 47 and 48 limit the amount of the calcium aluminate cement non-Newtonian additive to the ranges of 2.5 to 15 weight percent and 3.5 to 8 weight percent, respectively, support for which may be found in the specification on page 8, lines 8 - 10. None of the amendments raise any issue of new matter.

Applicants respectfully submit that the claim amendments presented herein are sufficient to overcome all the prior rejections under both 35 U.S.C. §112 and 35 USC §103(a). However, for clarity, and in an attempt to expedite the prosecution of the application,

Applicants respectfully request the Examiner to consider the additional comments presented in the next few paragraphs.

In Applicants' specification, it is indicated that non-Newtonian thickeners may be organic polymers. This is true. However, not all organic polymers are non-Newtonian thickeners. In fact, very few polymers are non-Newtonian thickeners. For example, polyethylene, polypropylene, and other organic thermoplastics display virtually no interaction with either the mineral phase of mortar compositions or the aqueous phase, and therefore have no thickening effect, whether Newtonian or non-Newtonian.

An associative thickener is an organic polymer which contains an internal hydrophile and external hydrophobes, such as those of claim 27. These polymers reversibly associate by overlap of their hydrophobes in an aqueous environment to produce "temporarily associated" very long molecules which remain solubilized due to their hydrophiles. In addition to those specifically claimed, it is possible, for example, to homopolymerize a hydrophilic monomer or precursor thereof such as vinyl acetate followed by homopolymerization of ethylene to produce an internal polyvinyl acetate block and external polyethylene blocks. If this polymer is then hydrolyzed to convert the vinyl acetate residues to hydroxyethylene moieties (i.e. polyvinyl alcohol), the polymer now has an internal polyvinyl alcohol hydrophile and external polyethylene hydrophobes, and would make a good non-Newtonian thickener. Polyethylene itself can never be an associative thickener, as it has no hydrophile.

Likewise, particles of conventional polyethylene, polypropylene, polystyrene, etc., can be added as balls or ovoids to a cement mixture to increase microcracking of the cement. These polymers function in this respect because they have essentially no attraction to the matrix. However, the addition of these inert particles does not affect the viscosity. The matrix sees them as empty voids, in contrast to aggregate like crushed rock and sand, which help prevent cracking, and are firmly bound to the matrix.


The *Kanda* reference teaches polyvinyl alcohol fibers as fibrous reinforcement. However, *Kanda* does not teach or suggest, or even mention the interfacial frictional stress requirement and interfacial chemical bonding requirements of claim 43. These requirements of the fiber/matrix interaction are necessary for strain hardening to take place. This is why, for example, conventional polyethylene fibers, polypropylene fibers, steel fibers, and brass fibers increase strength of cementitious composites, but do not result in strain hardening (ductility).

The Office asserts that because Applicants employ polyvinyl alcohol fibers and *Kanda* does also that the fibers of *Kanda* must meet the claim requirements. However, this is not so. Applicants can only use polyvinyl alcohol fibers which meet the interfacial frictional and chemical requirements alluded to above, and not all polyvinylalcohol fibers, such as those of *Kanda*, meet these requirements. For example, Applicants attempted to employ ordinary polyvinyl alcohol fibers and found that they did not result in strain hardening. Rather, a brittle composite was produced. Only when the interfacial frictional stress and interfacial chemical bonding were altered to be within the claimed range by oiling the polyvinyl alcohol fibers, was strain hardening achieved. There is no necessity to include “oiling” as a prerequisite for fibers, as not all fibers need oiling; only those with too high an attraction for the matrix. Whether or not any given fiber requires this can be determined by simple, readily performed tests, as indicated in the specification. Thus, there is no indication that *Kanda* used fibers which meet Applicants’ fiber requirements. *Kanda* does not mention any such requirements and gives one skilled in the art no reason to suspect that his fibers meet such requirements. *Kanda* does not teach or suggest the claim requirements.

Applicants submit that the claims are in condition for allowance, and respectfully request a Notice to that effect. Please charge the \$60.00 Petition fee and the additional claims fee of \$125.00 and any additional fees or credit any overpayments as a result of the filing of this paper to our Deposit Account No. 02-3978.

Respectfully submitted,

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